Attachment 1

Specification Subcommittee: _____
Engineering Policy Comm: _____
Team Leader: Julie Stotlemeyer

Rev 02-XX
Submitted by
(Date)

Team Members and Resources			
Julie Stotlemeyer	Llans Taylor		

(Rationale: Updated to current spec writing rules.)

SECTION 1060

ELECTRICAL CONDUIT

1060.1 Scope. This specification covers electrical conduit to be used as specified ~~elsewhere in the specifications~~ or as shown on the plans.

1060.2 Acceptance. All material in this section will be accepted based on certification indicating the material is in accordance with the requirements of the specification and any testing as required by the engineer.

1060.3 Material. Electrical conduit shall be in accordance with the required specification.

I'm not sure this adds anything I'd strike it.

1060.3.1 Rigid Metallic Conduit and Tubing. ~~This specification covers (1) zinc coated rigid steel conduit, (2) intermediate metal conduit, (3) rigid aluminum conduit, (4) zinc coated electrical metallic tubing and (5) fittings for rigid metal conduit, intermediate metal conduit and electrical metallic tubing.~~

~~1060.1.1~~

1060.3.1.1 Rigid Steel Conduit, Zinc Coated. ~~This material~~Rigid steel conduit, zinc coated, shall ~~conform to the requirements of~~be in accordance with ANSI C80.1, except the conduit shall be galvanized on both the inside and the outside surfaces by the hot-dip process. The weight (mass) of zinc coating shall be ~~not~~ less than 0.5 ounce per square foot (0.15 kg/m^2) of actual coated surface determined in accordance with AASHTO T 65. The zinc coating shall ~~meet the requirements~~be in accordance with ANSI C80.1 for ductility regardless of the time of manufacture of the conduit. The interior or exterior surfaces, or both, may be given a coating of suitable material to facilitate installation of wires and cables and to permit the conduit to be readily distinguished from pipe used for other than electrical purposes.

Isn't this repeating the first sentence? Can they be combined?

1060.~~1~~3.1.2.~~2~~ Intermediate Metal Conduit. ~~This material~~Intermediate metal conduit shall ~~conform to the requirements of~~ be in accordance with UL 1242. The exterior surface shall be galvanized. The weight (mass) of zinc coating shall be ~~not~~ less than 0.5 ounce per square foot (0.15 kg/m^2) of actual coated surface determined in accordance with AASHTO T 65. The zinc coating shall ~~meet the~~ be in accordance with ANSI C80.1 requirements for ductility regardless of the time of manufacture of the conduit. The interior surface shall be coated in accordance with UL 1242. The interior and exterior surfaces, or both, may be given a coating of suitable material to facilitate installation of wires and cables and to permit the conduit to be readily distinguished from pipe used for other than electrical purposes.

1060.~~1~~3.1.3.~~3~~ Rigid Aluminum Conduit. ~~This material~~Rigid aluminum conduit shall ~~conform to the requirements of~~ be in accordance with ANSI C80.5.

1060.~~1~~3.1.4.~~4~~ Electrical Metallic Tubing, Zinc Coated. ~~This material~~ Electrical metallic tubing, zinc coated shall ~~conform to the requirements of~~ be in accordance with ANSI C80.3 except the weight (mass) of zinc coating shall be ~~not~~ less than 0.5 ounce per square foot (0.15 kg/m^2) of coated surface, as

determined in accordance with AASHTO T 65. The zinc coating shall ~~meet the requirements~~be in accordance with ANSI C80.3 for ductility regardless of the time of manufacture of the tubing.

1060.~~1~~3.1.5.~~5~~ Fittings for Rigid Metal Conduit and Electrical Metallic Tubing. Fittings shall ~~conform to the requirements of~~be in accordance with ANSI C80.4.

1060.~~1~~3.1.6.~~6~~ Fittings for Intermediate Metal Conduit. Fittings shall ~~conform to the requirements of~~be in accordance with UL 1242, except the coating shall meet the same requirements as the conduit with which the fittings are used.

1060.~~1.7~~3.1.7 Inspection. Conduit, tubing and fittings will be inspected for compliance with ~~the~~ specifications, ~~and~~ any desired samples will be taken at either the project location or warehouse, ~~at the option of~~as directed by the engineer. Test specimens for determination of weight (mass) of coating will be ~~not less than~~ 2 inches (50 mm) long, cut not less than 6 inches (150 mm) from the end of the length of conduit or tubing selected for testing. If the prescribed two additional samples for retests are taken, and either does not comply, the lot represented will be rejected.

~~**1060.1.8 Certifications.** If requested by the engineer, t~~The contractor shall furnish ~~three copies of the~~ a ~~manufacturer's certification in triplicate, showing typical test results representative of the material, and certifying that the material supplied conforms to~~ is in accordance with all of the requirements specified. ~~If requested by the engineer, the contractor shall also furnish typical test results representative of the material.~~

1060.~~2~~ 3.2 Rigid Nonmetallic Conduit. Rigid nonmetallic conduit shall be ~~made of~~ either polyvinyl chloride (PVC) or heavy duty polyethylene (PE).

1060.3.2.1 PVC Conduit. PVC conduit, bends, couplings and fittings shall ~~conform to the requirements of~~be in accordance with ~~Underwriters Laboratories Standard~~ UL 651.

1060.~~2~~3.2.2 Heavy Duty PE Conduit. Heavy duty PE conduit shall ~~conform to the requirements of~~be in accordance with ASTM D 3035 SDR11.

1060.~~2~~3.2.3 Inspection. ~~The~~ material will be inspected for compliance with the specifications, and desired samples will be taken at either the project location or warehouse, ~~at the option of~~as directed by the engineer.

1060.~~2~~.4 Certification. The contractor shall furnish three copies of the ~~a~~ manufacturer's certification, ~~in triplicate,~~ certifying ~~that~~ the material supplied ~~conforms to~~is in accordance with all the requirements specified. If requested by the engineer, the contractor shall also furnish typical test results representative of the material.

Attachment Z

SCHAEFFER
Marketing Group
Incorporated

5427 TELEGRAPH RD.
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ELECTRICAL MANUFACTURERS' REPRESENTATIVE

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9/27/02

Julie Stotlemeyer
Signal and Lighting Engineer
MODOT
P.O. Box 270
Jefferson City, MO 65102

Dear Julie:

On behalf of Carlon we would suggest the following changes.

Section 1060.2.3.2: Change "heavy duty" to "high density" and "PE" to "HDPE."

Section 1062.3.2.1: Add a reference to NEMA standard TC-2 for conduit. Also, "PVC fittings shall be UL listed and conform to NNEMA TC-3. Cement shall be by the same manufacturer as the fittings and conduit." "~~For Directional Boring applications, a special PVC conduit known as Boregard may be used.~~"

Section 1062.23.2.2: Change "Heavy Duty" to "High Density Polyethylene (HDPE)." Suggest Adding: "Color shall be black with three red stripes for all line voltage applications and shall be UL listed. HDPE shall be installed in continuous lengths and not spliced by any method. Fittings for HDPE can be of PVC if joined by a special epoxy ~~approved by MODOT for the purpose~~. Other non-metallic mechanical fittings especially designed for the purpose may also be approved."

Thank you for your consideration and allowing us an opportunity to review the Spec.

Sincerely,

Mike Schaeffer, PE
Schaeffer Marketing Group

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Marketing Group
Incorporated

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Section 1062.23.2.2: Change "Heavy Duty" to "High Density Polyethylene (HDPE)." Suggest Adding: "Color shall be black with three red stripes for all line voltage applications and shall be UL listed. HDPE shall be installed in continuous lengths and not spliced by any method. Fittings for HDPE can be of PVC if joined by a special epoxy approved by MODOT for the purpose. Other non-metallic mechanical fittings especially designed for the purpose may also be approved."

Thank you for your consideration and allowing us an opportunity to review the Spec.

Sincerely,

Mike Schaeffer, PE
Schaeffer Marketing Group

Attachment 3

Specification Subcommittee: _____ Rev 02-xx
Engineering Policy Comm: _____ Submitted by
Team Leader: _____ (Date)

Team Members and Resources			
Julie Stotlemeyer	Llans Taylor		
John Schaeffer, SSI	Revised 9/19/02		

Enacted on pause 01

(Rationale: Updated to current spec writing rules.)

SECTION 1060

ELECTRICAL CONDUIT

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1060.2 Acceptance. All material in this section will be accepted based on certification indicating the material is in accordance with the requirements of the specification and any testing as required by the engineer.

1060.3 Material. Electrical conduit shall be in accordance with the required specification.

1060.3.1 Rigid Metallic Conduit and Tubing. ~~This specification covers (1) zinc coated rigid steel conduit, (2) intermediate metal conduit, (3) rigid aluminum conduit, (4) zinc coated electrical metallic tubing and (5) fittings for rigid metal conduit, intermediate metal conduit and electrical metallic tubing.~~

Zn coated ~~Galvanized~~ - Title of ANSI Std.

~~1060.1.1~~

1060.3.1.1 Rigid Galvanized Steel Conduit, Zinc Coated. ~~This material~~Rigid Galvanized Steel (~~RGC~~) Conduit, zinc coated shall ~~conform to the requirements of~~be in accordance with UL 6 and ANSI C80.1, ~~except the conduit shall be galvanized on both the inside and the outside surfaces by the hot dip process. The weight (mass) of zinc coating shall be not less than 0.5 ounce per square foot (0.15 kg/m2) of actual coated surface determined in accordance with AASHTO T 65~~. The zinc coating on the exterior surface shall be equivalent to a minimum thickness of .0008 inches (0.02 mm). The zinc coating shall ~~meet the requirements~~ be in accordance with ANSI C80.1 for ductility regardless of the time of manufacture of the conduit. The interior or exterior surfaces, or both, may be given a coating of suitable material to facilitate installation of wires and cables and to permit the conduit to be readily distinguished from pipe used for other than electrical purposes.

ok to eliminate interior

left because we want ANSI Std.

Covered by ANSI

1060.~~13~~.1.2.~~2~~ Intermediate Metal Conduit. ~~This material~~Intermediate Mmetal Ceonduit (IMC) shall ~~conform to the requirements of~~be in accordance with UL 1242 and ANSI C80.6. The zinc coating on the exterior surface shall be equivalent to a minimum thickness of .0008 inches (0.02 mm) ~~galvanized. The weight (mass) of zinc coating shall be not less than 0.5 ounce per square foot (0.15 kg/m^2) of actual coated surface determined in accordance with AASHTO T 65.~~ The zinc coating shall meet the be in accordance with ANSI C80.~~6~~1 requirements for ductility regardless of the time of manufacture of the conduit. The interior surface shall be coated in accordance with ANSI C80.6 ~~UL 1242~~. The interior and exterior surfaces, or both, may be given a coating of suitable material to facilitate installation of wires and cables and to permit the conduit to be readily distinguished from pipe used for other than electrical purposes.

1060.~~13~~.1.3.~~3~~ Rigid Aluminum Conduit. ~~This material~~Rigid Aaluminum Ceonduit (RAC) shall ~~conform to the requirements of~~be in accordance with UL Standard 6 and ANSI C80.5.

1060.~~1~~3.1.~~4~~.4 Electrical Metallic Tubing, Zinc Coated. ~~This material~~ Electrical Mmetallic Ttubing (EMT), zinc coated shall be mild steel, electrically welded, galvanized and ~~conform to the requirements of~~ be in accordance with UL Standard 797 and ANSI C80.3. The zinc coating on the exterior surface shall be equivalent to a minimum of .0008 inches (0.02 mm). The zinc coating shall be in accordance with ANSI C80.3 for ductility regardless of the time of manufacture of the tubing. The interior and exterior surfaces, or both, may be given a coating of suitable material to facilitate installation of wires and cables and to permit the conduit to be readily distinguished from pipe used for other than electrical purposes. ~~except the weight (mass) of zinc coating shall be not less than 0.5 ounce per square foot (0.15 kg/m^2) of coated surface, as determined in accordance with AASHTO T 65. The zinc coating shall meet the requirementsbe in accordance with ANSI C80.3 for ductility regardless of the time of manufacture of the tubing.~~

OK

1060.~~1~~3.1.~~5~~.5 Fittings for Rigid Metal Conduit and Electrical Metallic Tubing. Fittings shall ~~conform to the requirements of~~be in accordance with ANSI C80.4.

1060.~~1~~3.1.~~6~~.6 Fittings for Intermediate Metal Conduit. Fittings shall ~~conform to the requirements of~~be in accordance with UL 1242, except the coating shall meet the same requirements as the conduit with which the fittings are used.

1060.~~1.7~~3.1.7 Inspection. Conduit, tubing and fittings will be inspected for compliance with the specifications, and any desired samples will be taken at either the project location or warehouse, at ~~the option of~~as directed by the engineer. Test specimens for determination of weight (mass) of coating will be not less than 2 inches (50 mm) long, cut not less than 6 inches (150 mm) from the end of the length of conduit or tubing selected for testing. If the prescribed two additional samples for retests are taken, and either does not comply, the lot represented will be rejected.

~~**1060.1.8 Certifications.** If requested by the engineer, t~~The contractor shall furnish ~~three copies of the~~ a manufacturer's certification in triplicate, showing typical test results representative of the material, and ~~certifying that the material supplied conforms to is in accordance with all of the requirements specified. If requested by the engineer, the contractor shall also furnish typical test results representative of the material.~~

1060.~~2~~ 3.2 Rigid Nonmetallic Conduit. Rigid nonmetallic conduit shall be made of either polyvinyl chloride (PVC) or heavy duty polyethylene (PE).

1060.3.2.1 PVC Conduit. PVC conduit, bends, couplings and fittings shall ~~conform to the requirements of~~be in accordance with ~~Underwriters Laboratories Standard~~ UL 651 and 651-A. — Do'twant Ebor A want Sch 40, 80

1060.~~2~~3.2.2 Heavy Duty PE Conduit. Heavy duty PE conduit shall ~~conform to the requirements of~~be in accordance with ASTM D 3035 SDR11.

1060.~~2~~3.2.3 Inspection. The material will be inspected for compliance with the specifications, and desired samples will be taken at either the project location or warehouse, ~~at the option of~~as directed by the engineer.

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To →

Summary Sheet for Sec 1060				
Team Leader:	Julie Stotlemeyer			
Team Members:	Llans Taylor			
From: John Schaeffer, Schaeffer Sales				

Sec	Question #'s	Rationale
1060.1		Updated to current format for the Division 1000
1060.2		Updated to current format for the Division 1000
1060.3		Updated to current format for the Division 1000
1060.3.1.1	5	Updated to current spec writing
1060.3.1.2	5	Updated to current spec writing
1060.3.1.3	5	Updated to current spec writing
1060.3.1.4	5	Updated to current spec writing
1060.3.1.5	5	Updated to current spec writing
1060.3.1.6	5	Updated to current spec writing
1060.3.1.7	4	Updated to current spec writing
1060.1.8		Removed section and combined with 1060.4
1060.3.2.1	5	Updated to current spec writing
1060.3.2.2	5	Updated to current spec writing
1060.3.2.3	4	Updated to current spec writing
1060.4	6	Updated to current spec writing
	9/16/02	**Recommended changes by John Schaeffer, (LTV Tubular Products)**
1060.3.1.1		1) Changed name to industry accepted nomenclature of Rigid Galvanized Steel (RGC) Conduit. — ANSI C80.1 standard shows what we have w/ (GRC) 2) Added the UL Standard 6 for rigid metal conduit. — Not necessary; covered by ANSI 3) Deleted the AASHTO T 65 as this applies to sheet steel, galvanized wire and other articles, but not to electrical pipe/conduit. Also, RGC is hot dipped after forming. — May not apply.; refers to other articles; Not MoDOT uses for testing.
1060.3.1.2		1) Combined the Standards that this material must conform to, UL 1242 and changed to correct ANSI C80-6, Deleted the AASHTO T 65, as it does not relate to electrical conduit. — Same AA
1060.3.1.3		1) Added the UL Standard 6 for rigid metal conduit. — Same as ANSI; reference by Choice of MoDOT
1060.3.1.4		1) Added the UL Standard 797 for electrical metallic tubing. 2) Deleted the AASHTO T 65, as it does not relate to electrical conduit. — SAP